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ABSTRACT

An analysis is provided of patterns of community college enrollments between 1970 and 1980, with particular emphasis on variations among the states in enrollment and completion rates. Section I looks at recent trends in community colleges, focusing on enrollment, numbers of degrees conferred, vocational enrollments, curriculum changes, and the effects of economic and labor market conditions. Section II identifies possible causes of enrollment patterns, focusing on demand-related factors, such as direct costs, high-status employment opportunities, and access; supply-related factors, including tax capacity, educational attainment levels, and migration; and demographic factors. Section III analyzes the relationship between the demand- and supply-related variables and community college enrollments, section IV looks at the interaction of two- and four-year college enrollments, and section V examines the determinants of degrees conferred. Finally, section VI draws conclusions, including the following: (1) community college enrollments were only weakly related to labor market conditions; (2) prospective students were more sensitive to direct costs than to the earnings benefits of attending community colleges; (3) the state's overall tax effort and the educational level of the population influenced community college enrollments; (4) enrollment patterns tended to perpetuate themselves over time, regardless of other economic or political conditions; (5) completion rates tended to be less responsive to economic conditions than enrollment rates; (6) states with high levels of four-year college enrollments tended to have lower two-year college enrollments; and (6) several economic variables, such as the earnings differentials associated with higher education and the opportunity cost of attending community college, were more significant influences among women than among men. (AYC)

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VOCATIONALIZING HIGHER EDUCATION: THE CAUSES OF ENROLLMENT AND COMPLETION IN TWO-YEAR COLLEGES, 1970-1980

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VOCATIONALIZING HIGHER EDUCATION: THE CAUSES OF ENROLLMENT AND COMPLETION IN TWO-YEAR COLLEGES, 1970-1980*

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The community college has grown more rapidly than the rest of higher education over the past two decades. As the community college has expanded, its central purpose has changed. In the early 1960s the community college was a predominantly academic institution, with the goal of transferring to a four-year college foremost. During the 1960s and 1970s two-year institutions grew increasingly vocational, prodded partly by educators eager to increase middle-level skill training and reduce "over-education" at the B.A. level, and partly by the surge of student enrollments in vocational curricula (Brint and Karabel [10]; Zwerling [46]). Currently, the academic transfer function of two-year

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colleges has all but disappeared. Community colleges have become terminal institutions in which the majority of students take explicitly vocational courses, some of them completing an Associate of Arts (A.A.) degree or other formal certificate but many more taking a more informal schedule of courses with no formal degree.

The expansion and transformation of the community college provides an opportunity for studying examining how enrollment and completion are influenced by labor market conditions. In four-year institutions, for example, it has long been known that factors other than economic returns influence enrollment and graduation, including social class, race, ethnicity, ability, proximity, and access. It has also been obvious that four-year colleges are attractive as consumption as well as investment. However, the non-economic aspects of community colleges should be much less powerful. As community colleges have been vocationalized, the promise of economic returns has become their strongest selling point, and we might expect to find enrollments and completions closely related to labor market conditions.

This paper examines the patterns of community college enrollments between 1970 and 1980, a decade of rapid growth. Because community colleges systems are essentially creations of states, I examine variations among states in enrollment rates and completion rates, to see how closely these are related to economic conditions and to the state political conditions that lead legislatures to appropriate the necessary funds. Because enrollments in two-year and four-year institutions may be substitutes, I also investigate the interactions of these two levels of higher education across the fifty states.

I. RECENT TRENDS IN THE COMMUNITY COLLEGES

The growth of community colleges can be most readily measured by enrollments. The data in Table 1 indicate that enrollments in two-year institutions almost tripled during the 1970s, growing at an annual rate of almost 11 percent compared to a rate of about 2 percent in four-year institutions. Almost all of enrollment in two-year institutions--91 percent in 1980--was in public rather than private institutions, compared with 67 percent of undergraduates in four-year institutions. Therefore community college enrollments reflect the responsiveness of public appropriations to demand, rather than the enlargement of private institutions.

Another way to measure the growth of community college is to examine the numbers of degrees conferred. As the data in Table 2 indicate, the number of A.A. degrees and other formal awards below the A.A. level grew at an average annual rate of 6.65 percent during the 1970s--a somewhat lower growth rate than enrollments, but still more substantial than the annual growth rate of about 1.8 percent in B.A. degrees over the same period. Although the growth rate of A.A. degrees appears to have slowed somewhat in the early 1980s, it remains higher than growth in four-year institutions.

Currently, there is substantial agreement that two-year institutions have become predominantly vocational rather than academic, though the data to substantiate this trend remains elusive. Between 1965 and 1976 the proportion of two-year college students enrolled in vocational programs increased from 35 percent to 50 percent, and enrollment data suggest that perhaps three-quarters of enrollments are

Table 1

ENROLLMENTS IN TWO-YEAR AND FOUR-YEAR INSTITUTIONS, 1960-1980
(IN THOUSANDS)

	Two-Year Institutions	Four-Year Institutions (undergraduates only)
Fall 1960	451	2,776
Fall 1970	1,630	5,259
Fall 1975	2,508	5,960
Fall 1980	4,526	6,472
Average annual growth rate, 1960-1970	13.70%	6.60%
Average annual growth rate, 1970-1980	10.75%	2.10%

Source: Statistical Abstract of the United States, 1982-1983, Table 260, taken from the National Center for Educational Statistics, Fall Enrollments in Higher Education, various years.

now vocational.[1] Because enrollment data by degree fields are of poor quality (Barnes [4]), data on degrees completed provide a better measure of the shift towards vocational programs. As Table 2 indicates, 51 percent of A.A. degrees and other formal awards in 1970-1971 were in vocational programs rather than arts and sciences or general programs; by 1981-1982 this fraction had increased to 71 percent.

In the process of expanding and becoming increasingly vocational, post-secondary programs have begun to shift the locus of vocational education. In 1979-1980, 39 percent of all vocational education took place at the post-secondary level.[2] The importance of post-secondary vocational education may be even greater than these numbers indicate, since a great deal of secondary vocational enrollment is really avocational (in automobile courses, homemaking, and typing, for example). In addition, there is now substantial evidence that the rate of return to secondary vocational education over alternative curricula is essentially zero, while the evidence on post-secondary vocational programs is at least mixed.[3] Thus the most important developments in vocational education are now taking place within the community colleges.

Since most two-year institutions are funded predominantly through state (and local) funds rather than federal funds, this expansion has resulted from myriad decisions by students, state legislators, taxpayers, and local educators rather than from federal initiative or other centralized pressure. Supporters of community college have offered a simple explanation for enrollment growth in post-secondary vocational education: jobs requiring middle-level skills have grown faster than other jobs, and the skills for these jobs are more

Table 2

ASSOCIATE DEGREES AND OTHER PRE-B.A. AWARDS
BY CURRICULUM, 1971-1982

	1970-1971	1978-1979	1981-1982	Annual Growth (in percent) 1971-1979	Annual Growth (in percent) 1979-1982
Total, All curricula	307,880	515,371	560,694	6.65	2.8
Arts & science/general	149,885	162,663	160,977	1.0	-0.3
Data Processing	8,745	12,454	27,085	4.5	29.6
Programmers	2,149	4,122	10,026	8.5	34.5
Operators	387	927	1,214	11.5	9.4
Health Services	34,518	90,022	90,524	12.7	0.2
Nursing	22,116	50,880	52,511	11.0	1.1
Radiologic, surgical, optical technologies	1,463	6,082	5,627	19.5	-2.5
Mechanical/engineering technologies	38,900	71,288	98,753	7.9	11.5
Automotive & diesel	4,762	11,655	13,434	11.8	4.8
Construction	4,229	10,087	11,576	11.5	4.7
Electronics	7,851	14,613	25,181	8.1	19.9
Others	22,058	34,933	48,562	5.9	11.6
Natural science technologies	7,028	19,743	20,016	13.8	0.5
Agriculture	2,870	8,748	8,373	14.9	-1.4
Food service	693	3,789	4,520	23.7	6.1
Business & commerce	51,037	121,261	129,881	11.4	2.3
Public service	12,337	37,940	33,458	15.1	-4.1

Source: National Center for Educational Statistics, Associate Degrees and Other Formal Awards Below the Baccalaureate, various years.

appropriately learned in two-year colleges than in the high school or in four-year institutions (Pincus [37]; Harris and Grede [24]; Monroe [35]). These middle-level occupations include a large number of technicians, paraprofessionals, and semi-professionals, foremen, and skilled clerical and craft workers. Often, the growth of such occupations has been explained by technological developments, with the expansion of computer-related jobs and health technologists common examples of expanding occupations generated by technical advances.

There is at least some justification for these claims. As Table 2 indicates, a remarkable shift in curricula has taken place recently. During the 1970s the highest growth of completions in community colleges occurred in relatively conventional fields: in low-tech components of health services (for example, nursing and dental technology); in mechanical and engineering technologies (like automotive and construction trades); in agricultural and food services; in public services (police, firefighting, and child care); and, above all, in business and commerce. Growth rates in high-tech programs--data processing, health technologies, electronics, and the "other" component of mechanical and engineering technologies (which includes a variety of potentially high-tech occupations in instrumentation and other engineering-related fields)--were modest relative to the overall growth rate.

Since 1979 high-tech programs have dominated the growth of community colleges. Degree recipients in data processing, in electronics, and in the "other" component of mechanical and engineering technologies grew much more rapidly than in other areas; in fact, growth

in these areas exceeded the total growth of completers. Growth in business and commerce, health services, and natural science technologies tapered off, and the numbers of completers in public service and liberal arts actually declined. However, high-tech programs remain a small fraction of the total: data processing, health technologies, and the potentially high-tech mechanical and engineering technologies still account for only 19 percent of total completers, up from 13 percent a decade earlier.

If the claims of community college educators are valid, then we would expect to see two-year college enrollments and A.A. degrees determined principally by economic and labor market conditions, rather than by non-economic factors. This should be true both over time and across states; that is, we should expect to see enrollments expanding more rapidly in those fields where occupational demand is strongest, and we should expect to see enrollments and completion higher in those states with high demand for "middle-level" occupations.

II. THE CAUSES OF ENROLLMENT PATTERNS

Much of the research examining enrollment in higher education has examined those variables that would affect an individual's decision to enroll or not. Early studies confirmed the importance of income and price (tuition) effects; socio-economic status has been another important variable, reflecting cultural factors and educational barriers causing high-SES students to continue to college more readily than low-SES students.[4] Ability and proximity have been other important explanatory variables. Despite the importance of the rate of return to college in the human capital model of enrollment, relatively few studies

have incorporated measures of labor market conditions, though Matilla [33] confirmed a signficant positive effect of the rate of return on enrollment and Bishop [7] found a small response to the expected payoff to college.

Most of the empirical research on higher education enrollment has examined four-year institutions, or has analyzed enrollment by age groups without differentiating between two-year and four-year colleges. Lehr and Newton [31] examined community college enrollments in Oregon, and found them to be more sensitive to financial resources and to location than four-year enrollments. Corman and Davidson [15] examined enrollments in four-year colleges, two-year colleges, and post-secondary vocational schools across states in 1976, emphasizing the effects of tuition, opportunity costs as measured by unemployment, and income.[5] Sulock [40] also confirmed the effects of tuition, opportunity costs, and income in a sample of community colleges, and also confirmed that enrollments follow a non-linear time trend so that older institutions tend to be larger. Thus there has been little examination of community college enrollments, compared to the attention paid to enrollments in four-year colleges, and almost no attention paid to the effects of employment demand and other labor market variables.

In most studies the supply of places has not been explicitly considered. In effect, most analyses assume that the supply of college places is perfectly elastic, so that price (tuition) is set exogenously by college policies and enrollment is established by the demand of students. Supply limitations influence enrollment only through the inclusion of mesure of ability, reflecting the fact that many four-year

colleges ration places through entrance standards and thereby deny places low-ability students. However, because community colleges do not ration places with entrance standards, this would be an inappropriate way to model two-year enrollments. In addition, community colleges are almost entirely public institutions, and therefore the places available are due to political decisions rather than economic decisions related to the technologies of production that determine the usual supply functions. Therefore, it is necessary to consider explicitly the supply of places as well as demand by potential students.

Demand-Related Factors

The human capital model of attendance stresses that individuals make rational economic choices in deciding whether to invest in schooling, balancing the earnings advantage against both direct costs (tuition) and opportunity costs (foregone incomes). The earnings differential associated with continuing in school is especially critical as the equilibrating mechanism in labor markets: if demand for a specific occupation goes up, the related earnings differential should go up and more students will enroll in relevant educational programs in response to the higher rates of return. If students fail to respond to the earnings differential, there is no mechanism to equilibrate demand and supply; then permant excess supply (or excess demand) can persist for specific occupations or levels of schooling. Earnings differentials for community college students are measured here by the ratio of earnings for individuals with one to three years of college to earnings for high school graduates, and are measured separately for males (MDIFF13) and females (FDIFF13). (An appendix lists all variables, mnemonics, and sources.)

Direct costs, measured here by average community college tuition (CCTUITN) and opportunity costs may also influence enrollment, though they play no role in restoring equilibrium. Opportunity costs are measured by the average annual income of those 18-24 with 12 years of schooling, measured separately for males (MOPPC) and females (FOPPC). In addition, the overall unemployment rates (UE) is used as a measure of opportunity costs.[6] Community college administrators have often remarked that enrollments tend to be cyclical, as high unemployment rates cause higher enrollments among those unable to find work. This suggests that high unemployment reduces the opportunity cost of attending college. Still another possible effect of unemployment emerges from the model of job competition (Thurow [41]): if students attend community colleges to gain an advantage over other job applicants, then recessions--when competition for limited jobs becomes more intense--may lead to higher enrollments. However, the effect of unemployment may be ambiguous: if high unemployment tends to reduce the resources (including parental resources) available to support enrollment, then higher unemployment may reduce rather than increase enrollment.

If potential students respond only to the rate of return, then these variables should be sufficient to describe the demand for community college places. However, individuals contemplating higher education are likely to be concerned with the likelihood of high-status employment oppportunities as well as with higher average earnings. Employment opportunities are measured in this study by the proportion of the labor force in professional and managerial occupations (PCPROF) and by the growth rates of professional and managerial occupations over ten years (PROFGRO).

While community college tuition may affect enrollment, average tuition in public and private four-year institution (PUBTUITN and PRITUITN) may also affect two-year enrollments if students go to community colleges when they cannot afford four-year colleges. The coefficients on four-year tuitions can then be used to calculate cross-price elasticities.

Community college administrators have stressed that easy access is an advantage of two-year colleges, and several earlier studies found that access problems do reduce attendance (Kohn, Manski, and Mundel [30]; Lehr and Newton [31]; Hoenack and Weiler [26]). Access is measured here by the percent of the population in rural areas (PCTRUR), since community colleges are still largely urban (or suburban).

Still other demand-related variables can be devised, though most of them prove to have no explanatory power. Since ability is such an important predictor of individual enrollment in four-year colleges, ability as measured by average SAT scores was tried, but without results. Another potential barrier to attendance is a lack of financial resources, but greater amounts of financial aid also proved to have no explanatory power--perhaps because many community college students combine work and schooling, obviating the need for financial aid. Vocational tracking at the high school level, which tends to direct students away from college attendance, can be another barrier (Manski and Wise [32]), but vocational enrollments in high school did not reduce community college attendance as hypothesized.

Weiss [42] has argued that prospective students should respond to the variance as well as the average level of earnings associated with

higher education. If the variance of earnings decreases with higher levels of schooling, risk-averse individuals should pursue higher education for its effects in reducing risk. However, the expected positive relation between the enrollment and the effect of education in reducing risk[7] did not materialize. It seems likely that earnings differences associated with education are difficult enough to learn, and that the variance of earnings is not known by prospective students.

Finally, Johnson [29] has argued that the demand for general education will increase as occupational mobility increases, because higher levels of general education prepare an individual better for job changes; the effect of greater mobility on the demand for specific education is ambiguous. The implication for the demand for community college enrollment is unclear, since so much of the community college curriculum is occupationally-specific. In fact, efforts to find any effect of occupational mobility (as measured by accession and separation rates in manufacturing) on enrollments proved fruitless.

Supply-related Factors

The supply of places in community college is largely a state decision: 91 percent of community college enrollments are in public institutions, and in these institutions 48 percent of all revenues and 70 percent of government funds come from state governments. In contrast, tuition provides only 14 percent of revenues, and local governments provide about 19 percent.[8] This political decision is similar to the decisions about other public expenditures, like local expenditures for elementary and secondary education, or state expenditures for health and welfare programs. Conventionally, such

decisions are modeled as the outcome of citizen preferences under budget constraints, either by posing a utility function for units of government (e.g., Grubb and Osman [23]) or by assuming the median voter model of spending decisions (Barlow [3]; Bergstrom and Goodman [5]).

Budget constraints are measured by tax capacity (TAXCAP) as measured by the Advisory Committee on Intergovernmental Relations [1], an index of commonly-used state and local tax bases. Alternatively, state tax effort (TAXEFT)--revenues divided by tax capacity--is used, a measure which combines budget constraints with overall preferences for public expenditures. Tax capacity (or tax effort) is a more inclusive measure of budget constraints than the usual alternative, income, and is less likely to reflect variation among states in socio-economic status.

Conventionally, intergovernmental aid is considered one aspect of a state or local government's budget constraint. However, general revenue sharing funds per capita and federal vocational education funds per pupil consistently failed to have any explanatory power. A dummy variable (TXLMT) reflecting the passage of recent tax and expenditure limitations, a different kind of budget constraint, also proved to have little explanatory power.

As a measure of preferences for higher education, the average level of schooling in each state (SCHOOL) is used. Alternative measures of socio-economic status, often found to be positively related to public expenditures, proved inferior. Other measures of preferences also proved worthless, including the age structure (hypothesizing that the elderly might be less supportive of education) and the proportion voting Democratic (hypothesizing that more liberal states tend to support education relatively more).

If state legislators intend to provide public benefits for state residents only, then public funding will be lower in states with higher rates of out-migration. However, variables measuring mobility--either rates of net migration, or the proportion of state residents who lived in another state five years earlier (MOVERS)--may also be proxies for occupational mobility or simply for a state's rate of growth or decline, and thus it may be difficult to disentagle several causal mechanisms reflected in measures of mobility.

One other supply-related variable is worth investigating. Since appropriating funds for community colleges is a political process, it is susceptible to political pressure not only from prospective students and parents, but also from educators. If so, appropriations and the supply of places in community colleges may be partly due to the enterpreneurial and political activities of community college administrators. As a proxy for this hypothesis, I include administrators as a proportion of all community college employment (ADMIN), on the theory that large numbers of administrators increase political and entrepreneurial activity.

Other Variables

Three other variables are included whose causal effects are unclear. The proportion of black and Hispanics in each state's population (BLACK and HISP) have several possible effects. If there are racial barriers to college attendance, then these two variables should decrease attendance. On the other hand, the community college have claimed that their open door policies provide greater opportunities for minority students than four-year colleges. If so, then enrollments might be higher in states with large minority populations.

A final variable to be considered is a measure of a state's size, the log of population (LGPOP). If there are economies of scale in implementing a system of community colleges, then costs should be lower and the supply of places higher in larger states. More likely there are economies of scale in providing a variety of course offerings, so that only large states can easily establish community colleges that are simultaneously large enough to offer sufficient variety and numerous enough to be close to most students. Still another possibility is that large states need fear, less than small states, that students will move out of state, and thus are better able to capture the social benefits of education. If so then large states will be more willing to fund community colleges, especially as a method of economic development.

The demand for community college places is the outcome of decisions by individuals, and is most appropriately analyzed with data on individuals. The supply of places is the outcome of decisions by states, and the appropriate units of observation are the fifty states. Enrollments can then be analyzed by estimating a reduced-form equation, using either individuals or states as units of analysis. In this paper I take the second approach, analyzing variations among states in community college enrollments and completion as a function of both demand and supply-related factors.[9] (For other research on enrollment patterns by states, see Hoenack and Feldman [26], Hopkins [27], Corazzini, Dugan, and Grabowski [13], and Corman and Davidson [15].)

The causal mechanisms outlined in this section should apply both over time, to explain the overall growth in community college enrollments, and across states, to explain the considerable variation

across states in community college enrollment rates. This suggests that pooled cross-section data should be used, to estimate both cross-section and time-series effects; data for 1970, 1976, and 1980 could be combined for the 50 states to generate a data set with 150 observations. However, the validity of pooling several cross-sections depends on the homogeneity of the different cross-sections; if each cross-section yields significantly different regression coefficients, then pooling is invalid. In fact, for this reason pooling proved impossible, and so the major results of the paper depend on cross-section data for years around 1980.

III. DETERMINANTS OF COMMUNITY COLLEGE ENROLLMENTS

Patterns in community colleges can be measured by enrollments or by completion. This section presents results on enrollment rates measured by community college enrollments as a fraction of the population 18-24 (CCENR). The denominator of this rate does not include the entire pool from which community colleges draw their students, because of significant numbers of older students;[18] however, a denominator including older groups makes almost no difference to the variation across states. The dependent variable varies from .035 in Washington and .033 in California to .001 in South Dakota, confirming wide interstate variation in the extent of community college enrollments.

Table 3 presents the results of ordinary least squares regressions analyzing community college enrollments in fall 1979. The first regression includes a variety of demand and supply-related variables; the second regression eliminates variables of low explanatory power. One robust result is that the earnings differential for women is

significant but not the differential for men, suggesting that women respond more to economic incentives than do men. The coefficient of tuition is negative as expected, significant, and stable; it implies on price elasticity of -0.49, close to Sulock's estimate of -0.44. Opportunity costs and the unemployment rate have no influence on enrollments. The effect of private four-year college tuition (but not of public college tuition) is positive as hypothesized; this coefficient implies a cross-price elasticity of 0.45. States with higher growth rates for professional and managerial occupations do have higher community college enrollments, though the effects are of marginal significance. The potential problems of access in rural states prove to have no effect on enrollment.

Among the demand-related variables, tax effort has the expected positive sign and is significant (with an one-tailed test) in the second regression. The only significant variable related to preferences is SCHOOL. The sign on the proportion of administrators is unexpectedly negative; this probably implies that states with higher enrollment rates have relatively smaller administrative staffs because administration is roughly a fixed cost that need not increase proportional to enrollment. Thus the causality assumed is incorrect, and this variable is dropped.

The racial variables are never significant. However, larger states have signficantly higher enrollment rates as hypothesized, a result that is robust over many specifications.

The third regression of Table 3 adds two variables that reflect the effects of history: community college enrollment rates (CCENR69) and four-year enrollment rates (4YRENR69) a decade earlier. If enrollments

Table 3

REGRESSIONS ANALYZING COMMUNITY COLLEGE ENROLLMENT
FALL 1979

	(1)	(2)	(3)
Demand			
MDIFF13	.497	-	-
	(.27)		
FDIFF13	2.24	2.94	.389
	(1.34)	(2.36)	(0.31)
CCTUITN	-1.68	-1.69	-1.39
	(3.40)	(3.73)	(3.53)
PUBTUITN	-.296	-	-
	(0.55)		
PRITUITN	.301	.213	.094
	(2.66)	(2.69)	(1.27)
MOPCC	-.000016	-	-
	(0.07)		
FOPEC	-.00010	-	-
	(0.42)		
UE	.019	-	-
	(0.33)		
PROFGRO	.308	.505	.507
	(.78)	(1.82)	(1.88)
PCTRUR	-.0099	-	-
	(0.99)		
Supply			
TXEFT	.00370	.0065	.0050
	(.817)	(1.94)	(1.59)
SCHOOL	1.74	1.30	1.28
	(2.22)	(3.32)	(2.83)
ADMIN	-9.95	-	-
	(1.37)		
Other			
BLACK	.015	-	-
	(1.13)		
HISP	-.012	-	-
	(0.90)		
LGPOP	.231	.305	.159
	(1.84)	(4.44)	(2.31)
CCENR69	-		.707
			(3.41)
4YRENR69	-		-.237
			(1.66)
R^2	.764	.703	.795
S.E.E.	.442	.436	.372
N	48	48	48

t = statistics are in parentheses
S.E.E. = standard error of the equation

fail to respond to these independent variables, then current demand and supply conditions influence enrollments. However, the high explanatory power of the lagged enrollment variables indicates that historical factors have a powerful influence on enrollment. The causal mechanisms behind these effects are ambiguous. The positive coefficient of CCENR69 could reflect political mechanisms that perpetuate existing institutions. Alternatively, it could reflect cultural influences on student demand for community college attendance, tending to keep enrollment rates high in some states compared to others as a matter of tradition, habit, or convention. Conversely, states which have had relatively high enrollments in four-year colleges tend to have lower community college enrollments.

The inclusion of a lagged dependent variable in equation (3) converts this regression into a difference equation. The coefficient on the lagged dependent variable (CCENR69) describes the dynamic adjustment of the dependent variable out of equilibrium. If this coefficient is close to zero, then past enrollments have little influence on current enrollments and any adjustment towards a new equilibrium is relatively rapid. If the coeffiecient is close to one, then adjustment towards a new equilibrium is slow, retarded by the continued influence of past enrollments. In regression (3) this coefficient is .71, close to one (and in fact not significantly different from one). This implies that the adjustment mechanisms in community college enrollments are weak, and that patterns once established tend to persist despite changing economic and political conditions.

Although most other coefficients are still significant and little

different in regression (3), the coefficients PRITUITN and of FD1FF13 become insignificant. This suggests that community college enrollments are more sensitive to the direct costs of attending, rather than to the benefits as measured by earnings differences. In turn, this implies that communitu college enrollments are unlikely to respond if an oversupply of community college-educated individuals develops. Instead, states with high enrollment rates tend to keep these rates high despite current conditions.

Similar regressions (available from the authors) can be estimated for community college enrollments in 1969. These results have much less explanatory power, and the coefficients are so different from those in Table 3 that pooling the two cross-sections--a method that would allow more precise parameter estimates--would be inappropriate.

IV. THE INTERACTION OF TWO-YEAR AND FOUR-YEAR COLLEGE ENROLLMENTS

Two-year colleges and four-year colleges may be substitutes for one another. Some individuals denied entrance to four-year colleges, and some who cannot afford the time or costs of four-year college, enroll in community colleges instead. Conversely, some students attend community colleges with the idea of transferring to a four-year institution later. Two-year and four-year institutions can be substitutes for one another in political decisions as well. For example, California has made an explicit decision to expand its community college system rather than its four-year institutions, and North Carolina has made its community college system (rather than four-year colleges) the core of its economic development plan.

We might expect, then, that states with low two-year enrollment rates would have high four-year enrollments, and vice versa. There is some confirmation of this hypothesis in Table 3: the effect of four-year enrollments (4YRENR69) on community college enrollment ten years later is negative (though significant only with a one-tailed test). The issue in this section is whether there is a contemporaneous interaction, rather than only a lagged effect.

The interaction of two- and four-year enrollments can be modeled in two different ways. Since each enrollment may affect the other, a pair of simultaneous equations can be specified with CCENR and 4YRENR endogenous. The coefficient of each endogenous variable should be negative if two- and four-year enrollments are substitutes for one another.

However, the decision to enroll in a two-year institution is simultaneously the decision not to enroll in a four-year institution. This suggests that CCENR and 4YRENR are jointly determined, and that equations for CCENR and 4YRENR should be jointly estimated using Zellner's full-information method of seemingly-unrelated least squares. In this formulation, we would expect the errors in the two equations should be negatively correlated.[11]

Both these models require an equation to describe variations in four-year college enrollments. Following the logic of Section II, four-year enrollments should be the result of demand for places and the supply of places as determined by a state political process (for public higher education) as well as the supply of places in private higher education. The results of four-year enrollments have relatively high

explanatory power, though they are weak on theoretical grounds.[12] However, the purpose of estimating these equations is not to test hypotheses about four-year enrollments, but to provide specifications for simultaneous estimation of equations for two-year enrollments. Table 4 present equations for two-year enrollments estimated with Zellner's method of seemingly unrelated least squares and with two-stage least squares. The coefficients for community college enrollments are generally quite similar to those in Table 3 above, with two important exceptions: the coefficient on the earnings differentials, FDIFF13, falls and becomes insignificant. The coefficient for growth rate of professional and managerial positions, PROFGRO, also falls below significance in the two-stage estimates. Thus it appears that once interactions between two-year and four-year enrollments are considered, these labor market effects on enrollment are no longer substantial.

As expected, the correlation between the errors equations for two-year and four-year enrollments is negative, though small, -.15. This confirms the hypothesis of some interaction between the two levels of higher education, so that states with higher enrollments in four-year colleges unexplained by the independent variables tend to have lower two-year enrollment rates, and vice versa. The simultaneous estimates confirm this interaction. The coefficient of four-year enrollments is negative as expected and significant in regression (4) (though not in the third regression). The coefficient of lagged four-year enrollment (4YRENR69) is now insignificant. This suggests that four-year enrollments tend to reduce contemporeneous two-year enrollments, rather than working with a log. However, in the equation for four-year enrollments corresponding to regression (4) of Table 4, the coefficient

of two-year enrollments is insignificant, so that the relationship between two- four-year enrollments may not be truly simultaneous. It is worth noting that the coefficient on the lagged endogenous variable EENR69 is always high--.71 in OLS estimation, .71 in Zellner estimation, and .84 in two-stage least squares estimation.

These results suggest that students turn to two-year colleges when they cannot attend four-year institutions, while there is no symmetric effect of community college enrollments on four-year enrollments. In addition, high community college enrollment rates tend to perpetuate themselves over time, a finding consistent with a low and incremental process of institution-building through greater political support and greater interest and acceptance of community colelges among prospective students. However, labor market conditions--often presumed to be the strongest reason for the growth of community colleges--prove to have little influence on enrollment patterns.

V. THE DETERMINANTS OF A.A. DEGREES

An alternative way to analyze community colleges is to examine degrees conferred--the Associate of Arts (A.A.) degrees and the other formal awards below the B.A. level. Degrees and enrollments do not necessarily follow the same patterns because of high drop-out rates from community colleges. Unlike the conventional patterns in four-year schools--entrance after high school and full-time attendance for four-years--there is no conventional pattern in community colleges, very little full-time attendance, and a much greater variation in ages. Community college enrollments include large numbers of students enrolled for avocational reasons, and others who are "shopping around" for a

Table 4

REGRESSIONS ANALYZING COMMUNITY COLLEGE ENROLLMENTS, Fall 1979

	Zellner estimates		Two-Stage least square estimates	
	(1)	(2)	(3)	(4)
4YRENR79	-	-	-.292	-.603
			(0.96)	(1.98)
Demand				
FDI[illegible]3	2.19	-.240	1.34	-2.14
	(1.80)	(0.19)	(0.70)	(1.29)
CCTUITN	-1.64	-1.37	-1.65	-1.30
	(3.72)	(3.57)	(3.82)	(3.72)
PRITUITN	.224	.113	.237	.139
	(2.86)	(1.55)	(3.11)	(2.06)
PROFGRO	.506	.476	.286	.281
	(1.85)	(1.80)	(0.89)	(1.09)
Supply				
TXEFT	.0066	.0049	.0061	.0059
	(2.01)	(1.61)	(1.91)	(2.11)
SCHOOL	1.42	1.40	1.59	1.37
	(3.66)	(3.14)	(3.66)	(3.41)
Other				
LGPOP	.321	.165	.263	.065
	(4.73)	(2.43)	(3.14)	(0.81)
CCENR69	-	.713	-	.842
		(3.50)		(4.22)
4YRENR69	-	-.260	-	-.047
		(1.86)		(0.29)
R^2	.718	.805	.740	.844
S.E.E.	.390	.324	.412	.328
N	47	47	47	47

career without definite vocational goals. One might therefore expect that the numbers of graduates would be more closely tied to economic conditions than the numbers of students enrolled.

On the other hand, there is at least some evidence that many students drop out of community colleges when they have recieved enough training for a specific occupation.[13] This implies that dropping out may be as responsive to economic conditions as completing a program.

In these results, completion of a community college program is measured by the number of A.A. degrees and other formal awards below the B.A. level divided by the population 18-24 (AA). Table 5 presents the results of analyzing interstate variation in this completion rate for the school year 1980-1981. The first regression shows erratic results, and much lower explanatory power than the comparable regression in Table 3. The second regression, eliminating variables with no explanatory power, confirms the weakness of these results. The earnings differential for women (FDIFF13) increases completion rates; the coefficient of private college tuition is positive and size (LGPOP) is still positive and highly significant, but the influence of the other variables is uncertain. The third and fourth regressions clarify why these results are so weak: much of the variation in completion can be explained simply by lagged enrollment rates CCENR79,[14] and especially by lagged completion rates AA70; these two variables account for over half of the total variation explained.

Thus it appears that completion of community college programs is largely a function of history, rather than of current economic and political conditions: a state that has established high rates of

TABLE 5

REGRESSIONS ANALYZING A.A. DEGREES, 1980-81

	(1)	(2)	(3)	(4)
Demand				
MDIFF13	.042	-	-	-
	(0.25)			
FDIFF13	.208	.230	.061	.0080
	(1.38)	(1.98)	(0.54)	(0.12)
CCTUITN	.024	-	-	-
	(0.54)			
PUBTUITN	-.037	-	-	-
	(0.75)			
PRITUITN	.017	.015	.0066	.0030
	(1.62)	(1.95)	(0.95)	(0.70)
MOPPC	-.000019	-	-	-
	(1.00)			
FOPPC	-.000014	-.00016	-.000023	.000016
	(0.63)	(1.39)	(2.19)	(2.04)
UE	-.0069	-.0076	-.0083	-.0055
	(0.63)	(1.78)	(2.21)	(2.41)
PROFGRO	-.037	-	-	-
	(1.05)			
PCTRUR	-.0068	-	-	-
	(0.76)			
Supply				
TXEFT	.00019	.00052	.00048	.00045
	(0.45)	(1.53)	(1.61)	(2.50)
SCHOOL	.091	.087	.012	-.080
	(1.29)	(1.59)	(0.23)	(2.39)
ADMIN	-1.08	-	-	-
	(1.65)			
Other				
BLACK	.00048	.00078	.000018	-.00088
	(0.39)	(0.77)	(0.02)	(1.57)
HISP	-.0021	-.00096	-.00010	-.00050
	(1.65)	(0.92)	(1.10)	(0.90)
LGPOP	.022	.022	.015	.0032
	(1.92)	(3.00)	(2.24)	(0.75)
CCENR79	-	-	.039	.016
			(3.51)	(2.18)
AA70	-	-	-	-.597
				(8.12)
R^2	.548	.427	.570	.848
S.E.E.	.040	.041	.036	.021
N	48	48	48	48

completion in the past continues to have high rates of completion, regardless of current conditions. The coefficient on the lagged dependent variable AA70, .597, is relatively high, suggesting relatively sluggish response to new economic or political conditions (though not as slow a response as for enrollments, for which the lagged coefficient above .70). Once this effect is considered, the other effects are minor. A higher tax effort increases completion, and states with large black populations tend to have lower completion rates. Unemployment has a significant negative effect, suggesting an income effect. Several variables have implausible sign reversals between regressions 3 and 4, especially SCHOOL and FOPPC. What is most notable about these results is that demand-related factors, and labor market conditions in particular, have such weak effects on community college completion.[18]

The real advantage of using data on completers is that information is available on A.A. degrees by field of study: arts and sciences; mechanical and engineering technologies; natural science technologies (including agriculture, forestry, food services, and home economics); business and commerce (including "secretarial technologies" as well as accounting, marketing, and general business); data processing technologies, including programming and computer operation; health service programs; and public service curricula, including programs for law enforcement, recreation and social workers, educational aides, child care workers, and other semi-professionals in the public sector. These data make it possible to examine whether enrollments in specific curricula are a function of the demand for specific occupations. The heterogeneity of these curriculum groups makes it difficult to match each curriculum precisely to corresponding occupations, although in most

cases a program of study is related to a few relatively large occupations.[16]

Table 6 presents regressions analyzing variation among states in A.A. degrees by field of study. The specification used is that of the fourth equation of Table 5, though the important results are not sensitive to specification. The variable PCOCC in these equations represents the proportion of the state's labor force employed in occupations related to the specific curriculum of the dependent variable; the variable OCCGRO represents the growth rate between 1970 and 1980 in these same occupations. (The two tend not to be highly correlated.) The inclusion of both variables allows us to see whether completions in specific fields respond to either the level of related employment or to growth, or to both.

The major conclusion from these equations is similar to the conclusion from Table 5. Few independent variables aside from enrollment rates and the dependent variable lagged ten years have much explanatory power. The proportion of the labor force employed in related occupations is significant only for health services and for data processing, and the growth rate of occupations is never significant. No other demand-related variable is significant for any field of study (except for FDIFF13, which is significant with the wrong sign for public service curricula).

States with high tax efforts generate higher rates of completion in natural science programs, in business and commerce, and in public service programs. The other variable measuring preferences, SCHOOL, is either insignificant or has the wrong sign. States with large

proportions of blacks tend to have fewer completions in mechanical/engineering and natural science programs, and states with large proportions of Hispanics have lower rates of completion in data processing programs, both suggesting that some barriers to completion for minorities exist. These results are consistent with the findings that minorities tend to face special barriers in math, science, and technical areas (Berryman [6]).

The coefficients on the lagged dependent variables are relatively high for all curricula except natural science programs and public service programs. This confirms the result from Table 5 that completion rates tend to reflect historical factors rather than current conditions, and that responsiveness to changes--including changes in labor market conditions--tends to be relatively slow.

These results do not support the view that community college completion is related to labor market conditions. Differences among states in occupational composition have little effect, and other labor market conditions--earnings differentials, opportunity costs, and unemployment rates--are similarly without effect. It may be instead that students drop out of community colleges when jobs become available, so that rates of comletion may be lower under economic conditions that would normally favor completion.[17] The dominant finding is one of rigidity and unresponsiveness: programs once established tend to perpetuate themselves, and any process of adjusting to new conditions is likely to be relatively slow.

VI. SOME CONCLUSIONS

Table 6

REGRESSIONS ANALYZING A.A. DEGREES BY FIELD, 1980-1981

	Arts and Sciences	Mechanical and Engineering	Natural Sciences	Health Services
Demand				
FDIFF13	.035	-.0078	-.0058	-.029
	(.81)	(.24)	(.28)	(1.90)
FOPCC	.000007	9.65×10^{-7}	-7.52×10^{-7}	-.0000011
	(1.65)	(.32)	(.32)	(.66)
UE	.00014	-.00066	-.00095	.00074
	(.09)	(.60)	(1.23)	(1.43)
PCOCC	-.00082	.017	-.028	.470
	(.64)	(.16)	(.70)	(2.74)
OCCGRO	.0040	-.0040	-.0077	.0066
	(.39)	(.38)	(.80)	(1.19)
Supply				
TXEFT	.000021	.00011	.00017	-.000072
	(.17)	(1.30)	(3.13)	(1.65)
SCHOOL	.015	-.023	-.024	.0056
	(.61)	(1.57)	(2.51)	(.72)
Other				
BLACK	.00015	-.00051	-.00050	.000035
	(.40)	(2.13)	(.297)	(.26)
HISP	.000002	-.000010	.000001	-.000058
	(.01)	(.04)	(.06)	(.42)
LGPOP	.0027	-.0011	-.0019	-.00031
	(.95)	(.54)	(.133)	(.27)
CCENR79	.0034	.0022	.0037	.0015
	(.78)	(.75)	(1.83)	(.97)
Lagged dependent variable	.58	.633	.183	.667
	(10.94)	(4.45)	(.43)	(3.68)
R^2	.876	.546	.404	.552
$\bar{R}^2$	.834	.394	.206	.403
N	49	49	49	49

T - statistics are in parentheses.

Table 6
continued

	Public Service	Data Processing	Business and Commerce
Demand			
FD1FF13	-.031	-.0084	-.064
	(2.67)	(1.10)	(1.70)
FOPPC	-8.10×10^{-7}	6.26×10^{-7}	.0000012
	(.63)	(.90)	(.28)
UE	-.000010	.000095	-.0016
	(.03)	(.39)	(1.29)
PCOCC	.088	.225	-.014
	(1.26)	(2.00)	(.12)
OCCGRO	-.0052	.0015	-.0072
	(1.20)	(1.23)	(.49)
Supply			
TXEFT	.000066	.000011	.00029
	(2.01)	(.56)	(2.61)
SCHOOL	-.0022	-.0052	-.048
	(.40)	(1.41)	(2.14)
Other			
BLACK	.000038	-.000086	-.00066
	(.41)	(1.50)	(1.88)
HISP	.00014	-.00012	.000047
	(1.41)	(2.14)	(.13)
LGPOP	-.0010	.00053	.0090
	(1.13)	(1.03)	(.28)
CCENR79	.0030	-.00053	.0038
	(2.51)	(.72)	(.98)
Lagged dependent variable	.255	.467	.744
	(1.33)	(2.81)	(5.59)
R^2	.455	.467	.683
$\bar{R}^2$	.273	.289	.577
N	49	49	49

Although community colleges have become increasingly vocational, enrollments are only weakly related to labor market conditions. Enrollments tend to be higher in areas with rapid growth in professional and managerial occupations, implying that employment opportunities stimulate greater enrollment, but the earnings differential associated with one to three years of college is never significant for men and is uncertain for women. Since tuition does affect enrollment rates, prospective students are more sensitive to direct costs than they are to the earnings benefits of attending community colleges. The opportunity costs of attendance also fail to affect enrollment rates, perhaps because community colleges allow students to combine work with schooling. The model, promoted by community college educators as well as human cpaital theorists, of enrollments responsive to changing economic conditions has little support, and there is little evidence that equilibrating mechanisms exist within the community colleges to keep the supply of students in line with the demand for "middle-level" skills.

Several variables reflecting political decisions--especially a state's overall tax effort and a measure of preferences for schooling, the educational level of the population--influence community college enrollments as expected. These results imply that states can influence community college enrollments through their appropriations and tuition policies--and that such educational planning has greater effects than labor market conditions. However, one of the most powerful and consistent results is simply that enrollments patterns tend to perpetuate themselves over time, regardless of other economic or political conditions These findings imply that the community colleges,

like other educational institutions, may have become relatively independent of the labor markets they are supposed to serve.

Another major conclusion is that completion rates are less responsive to economic conditions than is enrollment. Completion proves to be insensitive to almost all labor market conditions; instead, patterns of completion show a strong tendency to replicate themselves over time. This finding is consistent with the image of the community college as a highly informal training institution, where students enroll in specific courses but rarely stay long enough to complete either an A.A. degree or some other certificate program.

There does seem to be some interaction between enrollments in two-year and in four-year colleges. States with high levels of four-year college enrollments tend to have lower two-year college enrollments, while there is no reciprocal effect of community colleges on four-year institituions.

A final intriguing result is that several variables describing economic patterns among women--especially the earnings differentials associated with higher education, and the opportunity cost of attending community college--are more significant than the corresponding variables for men. This suggests that women may make more rational economic decisions than men. The results also indicate some differences among whites, blacks, and Hispanics. States with higher proportions of blacks tend to have lower enrollments in four-year institutions, and several specific fields--especially technical fields like mechanical and engineering programs and data processing--have lower rates of community college completion in states with higher proportions of minorities.[18]

These results suggest that future work should examine more closely the gender, racial, and ethnic differences in enrollment and completion patterns, especially because of the claim of educators that the community colleges are "the best expression in higher education of the egalitarian ideal of American life" (Vincent [45]).

It is unclear what the contribution of the community college to American higher education will be. The expansion of the two-year colleges is too recent, and basic information--about the economic returns to community colleges, their effects on educational attainments and mobility, and the patterns of students entering and leaving--has not been adequately examined. There are several possible directions the community colleges might take. One effort, popular throughout this century, is to improve labor market information and manpower forecasts, as a way of making sure that vocational programs keep supply in line with demand. If applied to the community colleges, this effort might introduce equilibrating mechanisms that now seem not to exist (Starr [39]). On the other hand, it is possible that the community colleges--like high school vocational programs before them--will continue to expand independently of labor market conditions, contributing to the process of educational inflation that has gone on throughout this century. Some potential developments--the continuation of educational inflation, the tendency of vocational programs to become independent of labor market patterns and "train for unemployment", the potential biases by gender, race, and ethnicity--are best avoided. The time to address such issues is now, while the community colleges are still relatively fluid institutions.

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Appendix

VARIABLES, NMEMONICS, AND SOURCES

Dependent Variables

CCENR	Community college enrollments divided by the population 18-24, fall 1969 and fall 1979. (1)
4YRENR	Undergraduate enrollments in four-year institutions divided by the population 18-24, fall 1969 and fall 1979. (1)
AA	Associate degrees and other formal awards below the B.A. level divided by the population 18-24, 1970-1971, and 1980-1981. (2)

Demand-Related Variables

MDIFF13	Ratio of earnings for men with 13-15 years of schooling to earnings for men with 12 years, 1969 and 1979. (3)
FDIFF13	Ratio of earnings for women with 13-15 years of schooling to earnings for women with 12 years, 1969 and 1979. (3)
CCTUITN	Average community college tuition, 1970 and 1980. (4)
PUBTUITN	Average tuition in public four-year institutions, 1970 and 1980. (4)
PRITUITN	Average tuition in private four-year institutions, 1970 and 1980. (4)
MOPPC	Average earnings of men 18-24 with 12 years of schooling, 1969 and 1979. (3)
FOPPC	Average earnings of women 18-24 with 12 years of schooling, 1969 and 1979. (3)
UE	Unemployment rate, 1970 and 1980. (3)

PCPROF — Proportion of the labor force employed and professionals as managers, 1970 and 1980. (3)

PROFGRO — Ratio of professional/managerial employment in 1980 to professional/managerial employment in 1970. (3)

PCTRUR — Proportion of the population living in rural areas, 1970 and 1980. (3)

Supply-Related Variables

TAXEFT — Tax effort, 1968-1969 and 1979-1980. (5)

SCHOOL — Average educational attainment of the adult population, 1970 and 1980. (3)

ADMIN — Community college administrators as a proportion community college personnel, 1971-1972 and October 1979. (6)

Other Variables

BLACK — Black population as a fraction of the total population, 1970 and 1980. (3)

HISP — Hispanic population as a fraction of the total population, 1970 and 1980. (3)

LGPOP — Log of total population, 1970 and 1980. (3)

Sources

1. National Center for Educational Statistics, Fall Enrollment in Institutions of Higher Education, Fall 1969 and Fall 1979.

2. National Center for Educational Statistics, Associate Degrees and Other Formal Awards Below the Baccalaureate, 1970-1971 and 1980-1981.

3. U.S. Census of the Population, 1970 and 1980, data taken from state volumes.

4. National Center for Educational Statistics, Financial Statistics of Institutions of Higher Education, for fiscal year 1970 and fiscal year 1980.

5. U.S. Advisory Commission on Intergovernmental Relations, Tax Capacity in the Fifty States, 1981, (Washington,D.C.: ACIR).

6. American Association of Community and Junior Colleges, Directory of Community, Technical, and Junior Colleges, for 1972 and 1980.

[1]AACJC [2]; more recent evidence comes from the Vocational Education Data System (VEDS), though these data are difficult to interpret and of suspect quality (Barnes [4].

[2]It is difficult to compare these data with earlier figures because of changes in ways of counting adult vocational education. These data come from the Vocational Education Data System (VEDS); see The Condition of Vocational Education, Table 3.10. The 1979-80 data are taken from unpublished VEDS data.

[3]However, the evidence on returns to post-secondary vocational programs is still not extensive. Among other evaluations of secondary-level vocational education, see Meyer and Wise [34]; Grasso and Shea [20]; Daymont and Rumberger [16]; Reubens [38]; The Vocational Education Study: The Final Report, Vocational Education Study Publication No. 8, (Washington, D.C.: National Institute of Education, September 1981), Chapter 7. For evidence on post-secondary programs, see Breneman and Nelson [9]; Blair, Finn, and Stevenson [8]; Heinemann and Sussna [25]; Wilms [43]; Wilms and Hansell [44]; Pincus [36].

[4]See Christensen, Melder, and Weisbrod [12]; Corrazini, Dugan, and Grabowski [13]; Bishop [7]; Freeman [18]; Galper and Dunn [19]; Campbell and Siegel [11]; Kohn, Manski, and Mundel [30]; Hoenack and Weiler [26]; Feldman and Hoenack [17]; Manski and Wise [32]. Jackson and Weathersby [28] review the evidence on price effects (including both tuition and loan policies).

[5]In addition, Corman [14] examined the choice between college and post-secondary vocational schools. These vocational schools are not the same as the community colleges, even though they may be close substitutes for the community colleges.

[6]Other unemployment measures--the unemployment rates for those 18-24, and for those working as semi-skilled operatives--were also tried, but in most cases added no explanatory power over the simple unemployment rate.

[7]This effect was measured by the ratio of the Gini coefficient of income for individuals with 1-3 years of college to the Gini for those with 12 years of high school. The lower this ratio, the greater the effect of education in reducing risk and the greater enrollments should be.

[8]These figures for fiscal year 1979, taken from Financial Status of Institutions for Higher Education FY 1979, Office of Educational Research and Improvements, Department of Education, May 1981.

[9]Examining variations across states has the advantage of simplicity and low cost, but compared to using data on individuals has the potential disadvantage of aggregation bias. The only data on individuals that also has location codes permitting a matching of state characteristics is the National Longitudinal Study of the High School Class of 1972.

[10]In 1980, 73 percent of students in two-year colleges were 18-24, compared to 83 percent ten year earlier. "School Enrollment - Social and Economic Characteristics of Students: October 1982", Bureau of the Census, Current Population Reports, Series P-20, No. 392, September 1984.

[11]Of course, it is possible to combine the logic of these two approaches and argue that three-stage least squares is the most appropriate method. Three-stage estimates prove to be almost exactly the same as two-stage estimates.

[12]These results, available from the authors upon request, confirm that the opportunity cost of college has a negative affect; states with high rates of in-migration, high proportion of rural areas, larger minority populations, and larger states tend to have lower enrollments. Lagged enrollment variables are relatively weak; the coefficient on the lagged dependent variable is .185, not significantly different from zero--suggesting that institutional rigidity is less of a problem for four-year than for two-year institutions.

[13]See Grubb, Glover, et al. [22]. The evidence of Wilms [44], showing that community college completers earn no more than those who drop out, is consistent with the possibility that early leavers have acquired enough skills for a specific job and can therefore earn as much as completers. (The evidence is also consistent with the hypothesis that the community college is worthless to both drop-outs and completers.) Some community college educators, recognizing that there are numerous "early exit" points before receiving an A.A., have begun to formalize these points by granting certificates at different stages of a program.

[14]Completion in 1980-1981 is regressed on enrollments in fall 1979. This would be the appropriate lag if students who enter complete a two-year program in two years, though this rarely happens. However, as long as the interstate variation in enrollment rates is stable from year to year, which is in fact the case, then the precise length of the lag used makes little difference.

[15]The results for completion rates in 1970-1971, available from the authors, are also relatively weak. Again, the strongest determinant of completion rates is simply the enrollment rate, and the effects of labor market conditions are weak.

[16]The curricula (by HEGIS code) are matched to detailed census occupations as follows. Data processing technologies--mathematical and computer scientists; computer programmers; computer equipment operators; data entry keyers; data processing equipment repairers. Health services--health assesment and treating occupations; health technologists and technicians; health service occupations. Mechanical and engineering technologies--engineering and related technologists and technicians; technicians, except health, engineering, and science; precision production, craft, and repair occupations. Natural science technologies--science technicians; farming, fishery, and fishing occupations; precision food productions; plant and system operators.

Public service technologies--social, recreation, and religious workers; teachers' aides; protective service occupations. Business and commerce curricula were matched with all managerial and professional specialty occupations, minus those included in other curricula; technical, sales, and administrative support personnel, minus those included in other curricula; and personal service occupations.

[17]There is some slight confirmation of this possibility. In the fourth regression of Table 5 the effect of a high opportunity costs (FOPPC) on completion rates is positive; in Table 6, the sign of the earnings differential FDIFF13 is often negative and significant or near significance.

[18]The fall enrollment data collected by the National Center for Educational Statistics is published by state by gender, making it possible to examine enrollment patterns for men and women. However, information on race and ethnicity is not collected in the fall enrollment survey, and would have to be included in order to examine racial and ethnic patterns in the future.

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